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ON RAILWAYS.

A SUBJECT which has of late been occupying no ordinary degree of the public attention, is the formation of railways on an extensive scale. Our readers are aware, that these are formed by rails, or pieces of iron fixed contiguous to each other, and fitted for supporting the wheels of carriages, which may be moved either by horses or by steam. Such have been used for a considerable time, on a small scale, at collieries, and other places where heavy articles are to be conveyed in large quantities, over short distances; and have been found so useful, that on them a single horse can draw eight or ten tons, at the rate of four miles an hour. It is now proposed to have such ways made of greater length, and to employ them, instead of canals or common roads, for conveying goods and passengers, by means of carriages propelled by steam. Already, indeed, many companies, with large capitals, are actively employed in taking the necessary steps for establishing such ways between Liverpool, Manchester, Birmingham, and various other places in England; and likewise between Glasgow and Edinburgh. We feel great satisfaction, also, in stating, that the formation of several such ways in Ireland is in contemplation. One, in particular, is proposed to be made between Waterford and Limerick, and another between Belfast and Dublin.

Convinced of the extraordinary importance of the proposed measures, we shall lay before our readers, some remarks on the principles of this mode of conveyance, and on the benefits which are likely to result, particularly to this country, from its adoption.

Railways are principally of two kinds. One of these, the *flat* or *tram railway*, consists of flat pieces of iron, connected with each other at their extremities, and having one edge turned up, to keep the wheel which moves on it, in its proper place. The other—which is called the *edge railway*, and which, with the same force, is found to produce greater effects—has its upper surface of a convex or wedge form; and the wheel, which is to move on it, is furnished with a corresponding groove to fit the rail. In either construction, two of these rails are placed parallel to each other, at the distance of three or four feet, to support the wheels of the vehicles; and there must be at least two pair of rails, to admit the passage of vehicles moving in contrary directions.

Now, by the experiments of Coulomb and others, it appears that *the resistance occasioned by surfaces moving on one another, is very nearly the same, whether the velocity is great or small.* Hence, on a railway, when a force is employed to move a load, one part of it, which is found to be proportional to the weight to be moved, is expended in overcoming the friction, and the rest of it tends to produce velocity. This latter part of the force, according to the experiments referred to, is constant, as well as the former; and would therefore tend perpetually to augment the velocity, which, were there no counteracting cause, would increase without limit. Such a cause exists, however, in the resistance of the air, which becomes very great when the motion is rapid; but is inconsiderable for velocities not exceeding ten or fifteen miles an hour.

In the application of animal force in propelling land carriages, there is another limit, which not only prevents the attainment of high velocities, but which, in swift motions, occasions a very great waste of power. This is the part of the force which is employed in carrying forward the body of the animal, and which consequently produces no effect on the vehicle. We know, indeed, that most horses, even when unloaded, could continue in motion but a very short time, at the rate of even ten or twelve miles an hour. When a boat is dragged on a canal by a horse, a part of the force exerted by the animal is also employed in carrying forward his own body: though this obstacle is much less felt in this case than in the former, as the motion is generally slow. Canals, however, present another powerful obstacle, in the resistance of the water. Contrary to the principle of friction above stated, this resistance increases rapidly as the velocity becomes greater; being proportional, not merely to the velocity, but to its square, so that the resistance to a motion of ten miles an hour, would be at least twenty-five times as great as to one of two miles an hour. The resistance of the medium, indeed, forms such an obstacle, that vessels, even in the most favourable circumstances, can never move in water with very great rapidity. We find accordingly, that steam vessels with the most powerful engines, even in the open sea, and before a strong and favourable gale, rarely sail with a velocity of more than ten or twelve miles an hour; while boats on canals seldom exceed the rate of two or three miles, in consequence of the passage of locks, and other obstructions.

From these and other considerations it will appear, that while goods are conveyed on canals at the rate of only two or three miles an hour, railways will afford a velocity of ten or fifteen miles, or even more, by additional power, if it should be thought necessary. Unlike canals, too, they are not obstructed by frost in winter, or drought in summer, or by frequent repairs; nothing, indeed, except a heavy fall of snow suspending their usefulness. By them, also, articles may be conveyed that are too bulky to pass through the locks of canals; and goods on them are not liable to the injuries to which they are exposed from storms, and other causes, on canals, particularly at their junctions with rivers. Railways, besides, are constructed at from a half to a fourth of the expense of ordinary canals. They also occupy less ground, and can often be carried in a more direct line, in consequence of their not requiring the same precision in point of level.

Over the present system of land carriage, by carts and waggons, they present the immense advantages of far greater despatch, and far superior power; a locomotive steam engine, of eight horse power, being capable of propelling a load of from thirty to fifty tons, at the rate of ten or twelve miles an hour: while, for the conveyance of mails and passengers, they hold out the promise of a degree of celerity never before contemplated. Another advantage, of extreme importance, is the *cheapness* of carriage and fares. According to the present system, the carriage of goods between Manchester and Liverpool, (a distance equal to that of Armagh from Belfast,) costs forty shillings a ton; but it is estimated that by the projected railway, a charge of eight or ten shillings a ton will afford the proprietors an ample return for the money expended.

Such are some of the advantages that may be expected to result, in any civilized country, from the use of rail-roads. In Ireland, however, from its peculiar circumstances, they seem likely to be valuable in an eminent degree. The soil is rich and fertile; and the country possesses numerous sources of wealth and prosperity: yet poverty and distress prevail extensively; and the horrors of famine are frequently felt in districts rarely equalled in fertility and natural resources. To what predisposing causes, political or moral, these melancholy effects are to be attributed, it is not our present business to inquire; but certain it is, that the immediate occasion is the want of industry, properly directed, among the numerous population. Manufactures and commerce are either wanting, or are too sparingly established; and agriculture languishes. To remove these evils, nothing perhaps would contribute more effectually than the establishment of easy, cheap, and rapid means of internal communication. Let the country be intersected with railways, passing through the most important districts, and terminating in the principal seaports; and from these leading lines, let branches be extended to neighbouring towns, mines, and other places of importance; and a new impulse will be communicated to the energies of the nation. At proper stations, stores and warehouses may be erected; and markets may be established, for the purchase of the articles produced in the neighbourhood, and the sale of others in return. The grazier and the farmer will then find a ready sale for their cattle, their butter, and their corn; and will thus have the most powerful motive for increased activity and exertion in raising articles, which can thus be disposed of to advantage. They will also be supplied, on more moderate terms, with whatever may be necessary for the culture of their grounds, or the erection of buildings, or for the comfort of themselves and their families; and, having the means of procuring these articles more abundantly than before, they will gradually acquire what is unfortunately too little felt in Ireland—a wish to have houses, food, and clothing, of a comfortable kind.

In many respects, Ireland presents great advantages for manufactures. The population is numerous, and labour cheap; and the fertility of the soil, if properly cultivated, is such as to supply ample provisions for a large manufacturing population. Now, the promoting of internal communication would materially facilitate the establishment of manufactures of almost every kind. Coals and other necessary articles would thus be procured on moderate terms; and the manufactured articles could be transported cheaply and rapidly to the proper market, so as to give the manufacturer an early return for his capital. Such facilities seem likely, indeed, to present the strongest inducements to British capitalists to form establishments in Ireland; as it is almost certain, that they could there manufacture their goods, by means of proper machinery, on terms considerably more moderate than they can do in Britain.

We have thus far confined our views to the effects which might be expected to result from the establishment of railroads in Ireland itself. There are other circumstances, however, which add greatly to the advantages already pointed out. Steam vessels are beginning to be more generally established for the conveyance of goods, and their number can be increased at pleasure. By means of such vessels, plying between the principal sea-ports in Britain and Ireland, and by the railways on both sides, the manufactures and produce of Ireland could be poured over Britain with despatch and certainty, and to the mutual advantage of both countries. The excellence of Irish provisions, of different kinds, is well known; and by the proposed means, they might be conveyed to England, in the best condition. Epping butter now sells, in London, at two shillings a pound; while in Ireland, butter of equal quality, can be had at half the price, and could be conveyed to any part of England, fresh and good. It is perfectly possible, indeed, that butter might be churned in the centre of Ireland one day, and be the next, on the tables of the rich or the poor, in Manchester or Birmingham; and eggs, poultry, and fleshmeat, might be conveyed with equal despatch.

From these considerations, therefore, we trust that landed proprietors, merchants, and all others in this country, who have it in their power to forward such an object, will bestow on the subject a due degree of attention; and will see reason to give their countenance and support to the intended measures. With respect to the proposed line between this town and Dublin, we think it may be of great advantage, particularly if it be kept in most places at a considerable distance from the sea coast, so as to open up the country as much as possible, and to have towns and agricultural districts on both sides. If this were done, branches, when they might appear necessary, could be carried at small expense to the principal towns, without interrupting the direction of the grand line. From the principal line, also, branches could be extended into the remoter parts of the kingdom. One, in particular, might be carried to Enniskillen, to form the connexion which has long been contemplated, by means of a canal. In this way, the intended communication could be opened at much less expense, and in a far more effectual manner than in the way formerly proposed; and this line, with the branches that might be connected with it, seems likely to contribute very materially to the prosperity of the province of Ulster. By this means, a large portion of fine country would be opened up; the value of land would be increased; and the establishment of manufactures, in districts which are ripe for their introduction, would be rendered practicable and easy. This town would receive a full share of the advantages that have been pointed out; and we trust, the inhabitants will make suitable exertions in forwarding the intended measures. We understand, indeed, that the subject is under the consideration of the Chamber of Commerce, and we expect much good to result from the exertions of that respectable and intelligent body.

Z. A.